National Institute of Environmental Health Sciences

Greenhouse warming and the 21st century hydroclimate of southwestern North America

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Year: 2010
Journal: Proceedings of The National Academy of Sciences of The United States of America. 107 (50): 21277-21282

Abstract:

Climate models robustly predict that the climate of southwestern North America, defined as the area from the western Great Plains to the Pacific Ocean and from the Oregon border to southern Mexico, will dry throughout the current century as a consequence of rising greenhouse gases. This regional drying is part of a general drying of the subtropics and poleward expansion of the subtropical dry zones. Through an analysis of 15 coupled climate models it is shown here that the drying is driven by a reduction of winter season precipitation associated with increased moisture divergence by the mean flow and reduced moisture convergence by transient eddies. Due to the presence of large amplitude decadal variations of presumed natural origin, observations to date cannot confirm that this transition to a drier climate is already underway, but it is anticipated that the anthropogenic drying will reach the amplitude of natural decadal variability by midcentury. In addition to this drop in total precipitation, warming is already causing a decline in mountain snow mass and an advance in the timing of spring snow melt disrupting the natural water storage systems that are part of the region's water supply system. Uncertainties in how radiative forcing will impact the tropical Pacific climate system create uncertainties in the amplitude of drying in southwest North America with a La Nina-like response creating a worst case scenario of greater drying.

Source: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3003097

Resource Description

Climate Scenario :

specification of climate scenario (set of assumptions about future states related to climate)

Special Report on Emissions Scenarios (SRES), Other Climate Scenario

Special Report on Emissions Scenarios (SRES) Scenario: SRES A1

Other Climate Scenario: A1B

Exposure :

weather or climate related pathway by which climate change affects health

Precipitation, Temperature

Geographic Feature:

resource focuses on specific type of geography

Freshwater

Geographic Location: ☑

resource focuses on specific location

United States

Health Impact: ☑

specification of health effect or disease related to climate change exposure

Health Outcome Unspecified

Mitigation/Adaptation: ☑

mitigation or adaptation strategy is a focus of resource

Adaptation

Model/Methodology: ☑

type of model used or methodology development is a focus of resource

Exposure Change Prediction

Resource Type: ☑

format or standard characteristic of resource

Research Article

Timescale: ☑

time period studied

Long-Term (>50 years)

Vulnerability/Impact Assessment: ☑

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content